

VIRGINIA GIS REFERENCE BOOK

General Application Category/Sub Application Name: Voter Registrar

Product /Service/Function Name: Redistricting

P/S/F/ Description: An application used by the government to define, redefine or adjust voting districts based on Commonwealth of Virginia Law. Portions of the application may be publicly available, deployed via an Internet map server. The application will also publicly display the Commonwealth's voting districts. .

Basic law. Equal representation is the key objective in redrawing district lines under the federal and Virginia constitutions. Decennial redistricting has become the norm because the new census reveals shifts in populations among districts. Uneven growth in a locality through the 1990s will create population imbalances among local election districts.¹

Demographic/population information, locality/magisterial boundaries, Census tracts and voting districts are geo-processed to determine that each newly defined district meets specific legal requirements.

Some commercial off the shelf (COTS) applications exist for redistricting and should be considered as an alternative to developing a customized solution in house.

The last redistricting and census data revealed the following statistics for the Commonwealth of Virginia:

- 150,000 Census blocks,
- 2160 precincts,
- 135 local governments,
- 7,000,000 people.¹

Product /Service/Function

1. Spatial Data

Minimum Requirements: City and County boundaries in vector polygon format; Magisterial boundaries in vector polygon format; U.S. Census Blocks, Block Groups, and Tracts in vector polygon format; State legislative districts in vector polygon format, and voting districts in vector polygon format.

Additionally, a base map containing major framework data layers (such as roads, railroads, hydrology, etc.) is required.

Optional Requirements:
None

2. Attribute Data:

Minimum Requirements:

- The City and County spatial data must be attributed with the City or County name.
- The voting districts must be attributed using their corresponding six-digit numerical code.
- Magisterial districts must be attributed with district name.
- U.S. Census data (Blocks, Block Groups and Tracts) must include the corresponding attribute data provided by the U.S. Census Bureau. This includes demographic and population data.
- State legislative districts should be attributed with the district name or number.

Optional Requirements:

None

3. Data Acquisition Options (integrated with VBMP digital orthos):

The integration of these data with the VBMP digital orthophotographs will provide a highly accurate base map and provide better positional accuracy of the newly defined Voting Districts.

4. Data Conflation Options (integrated with VBMP digital orthos):

Conflation is the method whereby a geographic feature is adjusted to fit a more accurate base map. This process can occur in variety of ways, with the least sophisticated being a “best-fit” methodology. The best-fit method is a visual inspection or comparison of a geographic feature’s current position to where it is or should be located on the more accurate base map.

Another conflation option includes rubber sheeting, a method using control points or existing boundaries to establish the new geographic position of a feature. Finally, the most accurate method of conflating data includes the use of Global Positioning Satellite technology (GPS), or traditional survey instruments to accurately locate each desired object’s physical location.

5. GUI / Programming Options:

Graphical User Interface Definition: (ESRI, GIS Glossary, 1996) A graphical method of controlling how a user interacts with a computer to perform various tasks. Instead of issuing commands at a prompt, the user performs desired tasks by using a mouse to choose from ‘a dashboard’ of options presented on the display screen. These are in the form of pictorial buttons (icons) and lists. Some GUI tools are dynamic and the user must manipulate a graphical object on the screen to invoke a function; for example, moving a slider bar to set a parameter value (e.g., setting the scale of a map).

GIS software can be modified utilizing a variety of programming languages or scripting languages and may vary depending upon the system architecture.

Languages such as Microsoft Visual Basic are commonly used to invoke macros and customized functions such as GIS queries. Commonly used languages include: Visual Basic, C++, Java, HTML, ASP, ColdFusion, JSP, PERL, PHP and CGI.

6. Internet Functionality and Options

Internet functionality should include basic GIS functions available in a thin client GIS application, such as ESRI's ArcExplorer (i.e. Zoom In, Zoom Out, Pan, Identify, Query, Thematic Mapping ... etc.). Additional functionality may include appropriate hyperlinks to critical and related information on the Internet related to certain queries or operations within the application. A dedicated "needs based" approach to determine user interface options and functionality is highly recommended before actual application work is to begin.

An Internet application allows the organization to share its spatial and tabular information to all authorized users via a familiar Internet Browser interface. This eliminates multiple software license fees. Additionally, the Map Server (Web Server) is the only GIS hardware/software component that would be managed by the localities Information Technology Department.

7. Minimum Technical Requirements

A Basic working knowledge of a leading GIS software, and Internet Browser are required. A Pentium III or greater CPU, with a minimum of 128MB Ram, 16MB video card, is required. A higher speed Internet connection is recommended for GIS Internet application deployment and analysis. Most leading GIS software is customizable using MS Visual Basic or other common language. It is suggested that the developer have a working knowledge of (at least) Visual Basic before attempting GUI development.

Optimum Technical Requirements:

In the case where a local government employs a highly capable Information Technology Department, other languages may be considered, such as JSP, Java, Visual Basic, ASP, and Cold Fusion. In most cases, these languages are related to Internet application development. A web developer with three years of experience should be able to customize and/or develop a unique Internet Map Server application.

8. Administrative / Management Requirements:

Management concerns will involve technical support, system maintenance and, of course, human resource management issues of a technical product. These issues are minimized if the maintenance and/or hosting of the application are contracted to a GIS application development and hosting organization. Technical and administrative issues become more critical and consuming when developing and/or hosting an application in-house. General expertise in GIS is suggested if outsourcing application development and hosting. In-house application development and hosting will require GIS specialist human resources, advanced

web programming human resources, and significant technical material resources (hardware/software).

9. Cost – Cost/Benefit:

The cost of developing this application (in house) is typically under \$25,000.

40% of this cost is attributed to spatial data development and conflation.

Programming the application, which includes posting custom queries to the GUI , accounts for the remaining 60%.

10. Standards / Guidelines Summary:

The spatial data and any ancillary databases should reflect changes or modifications as soon as realistically possible. This may occur when a district is redefined, or as more current Census information becomes available.

11. Startup Procedures/Steps:

Application Outline / Blueprint: Application purpose, interface design, functionality, queries and “look and feel” should be determined and documented as an initial step. Stakeholders should be involved in this step.

Data Acquisition: The attribute data should be obtained from the U.S. Census Bureau and the Commonwealth of Virginia (Department of Legislative Services) and normalized. Spatial base maps and other data can be generated internally, or obtained from various State sources including VGIN.

Sourcing Determination: Determine entity/entities that will be performing data development functions, application development functions and application hosting functions.

12. Estimated Time Line and/or Implementation (stand alone) schedule:

The estimated time to develop this application is approximately two to four months. Typically this type of application can be developed in about 225 man-hours.

13. Best Practice Examples in Virginia:

None Found.

Sources

¹ Virginia Department of Legislative Services, *The 2000 Census, a Guide Local Redistricting for 2001* ”